BRIEFER ARTICLES.

The flowers of the horsechestnut.—The fertilization of our common horsechestnut (*Æsculus Hippocastanum*) is an extremely interesting study.

The flower-clusters are terminal and of mixed inflorescence. At first sight the flowers on the individual branches appear to be arranged in racemes, as well as the branches themselves, but this cannot be the case, as the flowers are all on the upper side. The lowest flower opened first and was originally the terminal one. From its pedicel arose a lateral branch, also terminated by a flower, and this process went on, till the cluster contained, on an average, about eight flowers. The method of growth is the same as that of the leafy branch of the tree, where the stronger axillary bud of the pair next the flower-cluster throws its mate to one side, making it appear lateral instead of terminal.

There are many flowers in a single thyrsus. The branches average about twenty-five on my tree, with an average of eight flowers to a branch. There are more flowers on the lower branches, for they have more time to develop. The first flowers to mature are all staminate having a rudimentary pistil only. Later, other flowers with perfect pistils appear, and these are proterogynous, the style protruding from the bud. As far as my observations extend, these are from the fourth to the sixth flowers on the branch, the later ones being exclusively staminate. They generally appear on the lower branches. The stamens in the pistillate flowers are perfect and discharge their pollen. Müller mentions a case where the stamens do not discharge, as in the maples, but I have never seen this in the horsechestnut.

The nectar in the flower is secreted by an hypogynous disk. The corolla has four or five petals; when there are but four the lower petal is absent. Each petal has a claw and two projections where the blade joins the claw. These projections are pressed tightly against the stamens, and serve to protect the nectar from the rain, and to close the path to creeping insects. The petals are white, with yellow nectar guides, which change gradually to a beautiful crimson. The colors of the cluster are therefore variegated, the older flowers having crimson, the younger yellow spots, with varying shades of color according to the age of the flower. This change of color appears to keep the bees informed which flowers are not worth visiting, for I have never seen a bee waste his time by crawling into a deeply crimson spotted flower. The entrance to the nectar is at the base of the two upper petals, the path below being cut off by the projections on the petals and the position of the stamens.

The stamens are usually seven, and are at first declined. They rise one by one as they mature, and, if we are looking at the right time, we can see the anther of a stamen that has just risen split suddenly and become covered with pollen. When this takes place, the anther stands directly in the path to the nectar.

If we number the stamens, beginning at the upper right hand stamen and continuing in the direction of the hands of a clock, and then watch the order in which the anthers mature, we shall find that it is in one of the two following series, 3, 5, 4, 7, 2, 6, 1 or 5, 3, 4, 1, 6, 2, 7. One these series is the reverse of the other, for if we count in the first instance from right to left, beginning at the upper stamen on the right side of the flower, and in the second case from left to right, beginning at the upper left hand stamen the series of numbers will be the same. We can explain this by regarding the stamens as formed from two condensed cycles of staminate leaves, arranged on the two-fifths plan, with the three upper stamens belonging to the first cycle suppressed, leaving no. 3 and 5 only of this cycle of stamens, while the other five belong to the second cycle. On this hypothesis, the order of dehiscence follows the two-fifths plan, as any one may easily study out for himself. Normally, the stamens of the second cycle would stand in front of those of the first cycle, but the rule followed seems to be that the stamens arise where there is most room in the flower-bud and cause the cycles to alternate.

According to my observations, the missing stamens are the three upper ones of the outer cycle. Eichler, in his Blüthen-diagramme gives them differently. It is quite possible that different stamens may be suppressed in different localities, and the order of dehiscence in that case would be an interesting study. There is one curious little fact relating to this theoretical explanation. The stamens numbered 3 and 5 always mature about the same time and some hours before the rest, which then follow each other closely. Might this be because they belong to the outer cycle of which two succeeding members are suppressed?

It is very clear that a bee entering the flower would brush against the stamens and become dusted with pollen, and would leave this pollen on the style of the next pistillate flower visited, for the style curves upward and stands in exactly the same relation to the path to the nectar as do the stamens. I believe the flowers, however, to be self-fertile. The honey-bees have a wicked way of crawling about under the flower and stealing the nectar, but the humble-bees appear to visit the flower always in the proper way.

A very interesting adaptation in the horsechestnut is the presence

of well-developed buds in the upper axils of the leaves in the buds containing flower-clusters. These start at once in the spring and while the flower-cluster is still young become rapidly growing branches, while the leafy branches without flower-clusters have merely latent buds in their axils. When the flower-cluster drops off a new branch is ready to carry on the old one, which has been stopped in its growth. It is an interesting speculation as to the reason of this growth of the axillary bud or pair of buds. Perhaps it is able to take place because the development of the flower-cluster requires less nourishment.—JANE H. NEWELL, *Cambridge, Mass.*

Francis Wolle.—We regret to announce the death of the Rev. Francis Wolle, which took place at his home in Bethlehem, Pa., on February 10th, after long and paiefnl illness. Mr. Wolle was born in 1817, at Jacobsburg, Pa. From 1839 onward his life was devoted to the educational work of the Moravian church, with the exception of a few years of mercantile pursuits. For twenty years, from 1861 to 1881, he was principal of the Young Ladies Seminary at Bethlehem, and for five years previous served in practically the same capacity as assistant to his brother who was principal. In 1881 infirmity compelled his retirement from these active duties.

Mr. Wolle's interest in botany dates from about 1870. He first took up the study of phanerogams in which he received much assistance from Messrs. Robert and Eugene Rau, of Bethlehem. Later Mr. Wolle engaged in the study of mosses in connection with Mr. Eugene Rau. His interest was drawn to the fresh water algae, in connection with which his name will be best known, on obtaining the beautiful work of Dr. H. C. Wood on fresh water algae, published by the Smithsonian Institution. He soon entered into correspondence with Dr. Wood and Prof. Farlow in this country; later he received much encouragemeet and assistance from Rabenhorst, Wittrock, and Nordstedt abroad, in a study which became of engrossing interest. His industry in making known our fresh water flora resulted in the publication in 1884 of his "Desmids of the United States," containing 1,100 figures on 53 colored plates. This work was practically continued in 1887 by the publication of two volumes, one of text and one of plates, on the "Fresh Water Algae of the United States," in which we have over 2,300 figures on 157 colored plates. In 1891 appeared the volume of illustrations of the "Diatomaceae of the United States," 2,300 of which fill 112 plates, and in 1892 a revised edition of the "Desmids." These works, imperfect as such pioneer labor must necessarily be, will remain as a monument of untiring industry; and when it is remembered that Mr. Wolle was his own artist, the amount